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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/825,946	04/16/2004	Stephen Charles Hsu	18703-495	8208

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EXAMINER

ALSOMIRI, ISAM A

ART UNIT PAPER NUMBER

3662

DATE MAILED: 10/24/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/825,946	HSU ET AL.	
	Examiner	Art Unit	
	Isam Alsomiri	3662	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 04 August 2006.
- 2a) ☒ This action is FINAL. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-33 is/are pending in the application.
- 4a) Of the above claim(s) 19-26 and 33 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 6-11, 13-18, 27-29 and 32 is/are rejected.
- 7) ☒ Claim(s) 4, 5, 12, 30 and 31 is/are objected to.
- 8) ☒ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-3, 27-29, and 32 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of Miller et al. US 5,652,717 or Pack et al. US 20020060784A1.

Referring to claims 1, 27-28, and 32, Kumar discloses in figures 1-9 a method of registering camera images "frames", comprising: receiving a plurality of camera images; and registering at least two of the plurality of frames for determining a sensor pose with respect to a reference (see Abstract). Kumar does not teach the claimed "ladar frames" or receiving Ladar images. Miller and Pack both teach similar systems where both use Ladar devices to capture ladar images. It would have been obvious to modify Kumar's system to use Ladar images for better and accurate images that can also be used as range images.

Referring to claim 2. Kumar teaches the registering step uses information provided by a Global Positioning System GPS (see page 2 [0041]).

Referring to claims 3 and 29, Kumar teaches the registering step comprises: performing a coarse search for determining a translation shift; and performing a fine registration (see [0034] [0046])

Claims 15-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of (Miller et al. US 5,652,717 or Pack et al. US 20020060784A1) and Hsu et al. US006078701A.

Referring to claims 15-16, Kumar is silent about the sensor pose is determined using a bundle approach, where pairwise registration is performed on said plurality of ladar frames separated by different temporal distances. Hsu teaches the claimed pairwise registration (see col. 10 lines 34+). It would have been obvious to modify Kumar to include the pairwise registration for accurate alignment between the neighboring frames.

Claims 6-11 and 13-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al. US2001/0038718 in view of (Miller et al. US 5,652,717 or Pack et al. US 20020060784A1) and Burt et al. US005999662A.

Regarding claims 6-11, the combination (Kumar in view Miller or Pack) is silent about the fine registration step employs an iterated closest points for; eliminating false matches; extrapolated point to compute motion; removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration; ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit. Burt

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discloses in figure 6 the fine registration step employing an iterated closest points for; eliminating false matches 612, 304; extrapolated point to compute motion 608 (see Abstract); removes points in either ladar frame on an interior of a smooth densely sampled surface from consideration (see col. 12 lines 1-10); ignores closest point pairs within said at least two ladar frames with distance exceeding a Limit 612. (see col. 11 line 32 – col. 12 line 20). It would have been obvious to modify Kumar to include the ICP methods to eliminate errors in the images.

Regarding claim 13, the combination (Kumar in view Miller or Pack) do not teach a) creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and b) performing said ICP method at each of said plurality of resolution levels. Burt teaches creating a point cloud from said at least two ladar frames at a plurality of resolution levels; and performing said ICP method at each of said plurality of resolution levels (see figures 4 and 6, col. 11 line 32 – col. 12 line 20). It would have been obvious to modify the combination to include the ICP methods to eliminate errors in the images.

Referring to claim 14, the combination (Kumar in view Miller or Pack) is silent about the sensor pose is determined using a hierarchical approach, where groups of nearby ladar frames are first registered and then are aggregated into composite point sets. Burt teaches the claimed hierarchical approach (see figure 2c, col. 6 lines 8-12). It would have been obvious to modify Kumar to include the hierarchical approach for fast and better image combining.

Claims 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over anyone of Lee et al. US005995681A, Fling US005251271A, or Vashisth et al. US006759979B2.

Referring to claims 17-18, the combination (Kumar in view Miller or Pack) is silent about having static noise cleaning performed before the registering step, or dynamic noise cleaning performed before the registering step. However, noise cleaning is inherently done in the system prior to the registering step, and it would have been obvious to have static noise cleaning or dynamic noise cleaning depending on the system and which are both very well known method in the art for noise cleaning to obtain better images.

Allowable Subject Matter

Claims 4-5, 12, and 30-31 objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

Applicant's arguments filed August 4, 2006 have been fully considered but they are not persuasive. Regarding claims 1-3, 6-11,13-18, 27-29, and 32, applicant argues that "neither Miller nor Pack teach registering at least two of the plurality of ladar frames for determining a sensor pose with respect to a reference as recited in independent claims 1, 27 and 28". In response: Both Miller and Pack teach Ladar devices to capture

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ladar images. Therefore, Kumar in view of Miller or Pack can use the ladar images "active images" instead of the camera images. Applicant's argument against Miller and Pack not teaching registering at least two ladar frames is irrelevant because Kumar already teaches the registering step.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

Therefore the rejections are maintained.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Isam Alsomiri whose telephone number is 571-272-6970. The examiner can normally be reached on Monday-Friday 8:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Thomas Tarcza can be reached on 571-272-6979. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should

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you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Isam Alsomiri



October 16, 2006



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